Economics Information

REPT. NO. 84-04

Ontario

A COMPUTER PROGRAM FOR GENERATING CROP ENTERPRISE BUDGETS

ECONOMICS BRANCH

ONTARIO MINISTRY OF AGRICULTURE AND FOOD
LEGISLATIVE BUILDINGS, TORONTO, ONTARIO, M7A 1B6

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A COMPUTER PROGRAM FOR GENERATING CROP ENTERPRISE BUDGETS

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PART I: BUDGETS AND PRODUCTION COSTS

INTRODUCTION

The preparation and publishing of budgeted crop information has been an important function of the Economics Branch for many years. The computer program and budgeting approach described in this report represents an improvement in the production of crop budgets for farm and administrative use in Ontario.

From the development and testing perspective, a number of benefits are clearly evident. First, the use of this program will help to overcome the high level of resources needed to prepare budgets by hand. Accurate and complete budgets are time consuming to prepare. This computerized system will reduce time, as well as improve the arithmetic accuracy.

This budget generator will provide updated cost-return information for the Farm Business Management Handbook (FBMH). This farm management guide serves as a reference document for the production of many crops in Ontario.

The budget generator is advantageous as it provides consistency and it expands the number of crop budgets that can be prepared. Since all budgets are calculated by using the same method, comparisons can be made between two or more alternative crops when analyzing expected profitabilities. While many factors are considered when deciding which crop combinations to grow on an individual farm, the discrepancies that are created by using different budget methods are eliminated. Therefore a farm manager or advisor can devote more time to other nonquantifiable factors in choosing what to produce.

Another important benefit derived from the use of this budget generator is the standardization of cost estimates released by the Ministry. In the past, as many as three or four budgets on a single crop or commodity have been released by different sources within the Ministry and each may have had slightly different assumptions and techniques. Often this has been confusing to users. Because of the speed and ease with which budgets may now be generated, estimates could be prepared that would meet the requirements of most Ministry staff, and could be modified to meet specific farm, regional and other needs. In these cases, computer generated budgets would be dated and labeled as such, in order to prevent confusion.

The detail from this budget generator is an improvement over other similar computer models. Costs may be calculated on as many as 50 individual farm machines. These individual machine costs may be combined with 40 operations which may involve over 150 different machine combinations. There is still the opportunity to include custom farm operations to supplement owned farm equipment or even compute cost estimates based entirely on prevailing custom farmwork rates. Special attention has also been paid to the labor component of farm budgeting. This aspect is critical in some fruit and vegetable operations where several classes of labor may be brought in for specific tasks such as picking or harvesting. By using the budget generator, specific or typical cost estimates can be made for every crop produced in Ontario.

THE IMPORTANCE OF FARM RECORDS

Farmers must be effective decision makers to survive in today's economic climate. They must exercise decision-making skills in production, marketing and finance and must achieve an efficient production system that will provide the most profitable combination of crop and livestock enterprises. The successful manager must make efficient use of expensive equipment, skillfully deal with labor, plan cropping activities, decide upon the best time and place to sell products, as well as know the market constraints and opportunities available. In addition, the manager must be capable of adequate farm planning which demonstrates managerial capabilities and credit worthiness to lenders.

The farmer may be called upon to make complex decisions and still operate under conditions of risk and uncertainty. If farm goals are to be achieved, financial and cash flow statements must be prepared to improve the decision-making process. The preparation of a proper set of accounts is not possible without a complete set of farm records.

THE NEED FOR ASSISTANCE

Some farmers may not be able to keep up with all the technological advances that have taken place in farming practices over the past three or four decades. Research undertaken by universities, colleges, governments, and agribusiness firms has been often complex. Today's farmer must be conversant in a wide variety of topics such as machine management, estate and tax planning, government programs, credit, market conditions and price movements of commodities. Because of these developments, farmers may require information from many sources to meet their goals.

Extension assistance for farmers originated mainly with governments and universities. Both the Ontario Agricultural College and the Ontario Ministry of Agriculture and Food have worked to develop and maintain a comprehensive record keeping system. The Ministry maintains an extension service with increasing emphasis on financial counselling. Banks, accounting firms, agribusiness, and others also provide services in this area.

ROLE OF THE ECONOMICS BRANCH

The Economics Branch has helped develop a comprehensive record keeping system for farmers. When the Branch was organized in 1948, it was given the

mandate to develop farm and enterprise accounts. The accounts in the form of cost studies were designed to provide information on costs and returns of any farming operation.

Traditionally, single enterprise and livestock accounts were prepared for farmers. This was accomplished through farm visits, interviews, and then analyzing collected information. Summaries were sent to cooperating farmers. Reports in the form of county, regional and provincial averages were published and widely distributed.

SINGLE ENTERPRISE ACCOUNTS

Single enterprise accounts provide information on the direct and indirect cost and returns applying to a given enterprise. Single enterprise accounts can be particularly useful if a complete set of farm records is kept. Cost and return estimates derived from a single farm enterprise can be misleading if they are presented apart from the total farm picture. An enterprise that shows a profit year after year may not necessarily be as efficient as possible. Similarly, just because a particular farm enterprise does not show a profit, does not mean it should be dropped. The farm may be making the best use of resources.

Single enterprise accounts indicate the relative profitability of a particular commodity on an individual farm. When large numbers of accounts from different farms are averaged together it becomes possible to assess the financial health and profitability of a single commodity. For this reason, the preparation and analysis of single enterprise accounts or cost studies, have always been in high demand. Cost studies undertaken by the Economics Branch have been of interest to marketing boards, producer associations, governments, farm counsellors, administrators of government programs, beginning farmers and credit institutions. They have also been used by a diverse group of people for general budgeting purposes.

BUDGETING

There has been a gradual trend away from the collection, tabulation and analysis of single enterprise accounts and a trend toward budgeting. As more farmers keep accounts, they have a better idea of their costs and returns. Recently, the availability of computers and simple-to-use languages has made the task of record keeping easier. As more people make use of computer technology and accounting services, the need for institutions such as the Economics Branch to provide traditional accounting services has diminished. The ability to serve individual farmers has decreased, yet the need to provide accurate, reliable and representative cost and return data on a commodity basis has not.

A budget is a management tool used for planning. Farmers, professionals and others in the business of providing advice and counselling to farmers are developing general enterprise budgets to estimate present and future production costs and returns for a single commodity.

In the budgeting approach, special attention is paid to the quantities and prices of physical inputs. Information on the amount of physical inputs is gathered from a number of sources including: (1) previous studies, (2) surveys, (3) technical input/output coefficients, and (4) the consensus of knowledgeable

people such as farmers, extension workers, researchers and agribusiness personnel. The objective of the information gathering process is to construct producer profiles that represent typical production technology, cultural practices, and types and quantities of materials used for each important commodity. From the producer profiles and with current and projected price data, reliable and reasonable cost estimates may be made. The resulting enterprise budgets may be used to estimate costs and returns on a geographic basis and are used by decision makers at all levels.

THE A C R E S PROGRAM

Several computer programs that generate budgets have been developed. These computer programs vary in their degree of sophistication and in the amount of detail that they can provide. Most programs, however, can quickly and efficiently generate a large number of estimates for a wide range of conditions.

The ACRES (Agricultural CRop Enterprise System) program is the result of the efforts of a number of people in the Economics Branch. The program, written in FORTRAN by Gary Lentz, is based on a program originally written in Montana for use by the Extension and Soil Conservation Service. It was rewritten by Alberta Agriculture. The Alberta program was combined with a machinery cost program originally written by Blair Campbell. The present program integrates the Ontario machinery cost system and the Alberta Crop Costs and Returns Program.

PART II: METHODS AND OUTPUT OF ACRES

The first item that appears on the sample run of the program is a listing of the data that was used (Appendix 1). This is produced with every run of the program.

The second item is a listing of factors used in computing machinery costs. These include the interest rates used on debt and equity, the proportions of machinery owned and financed, the cost of gasoline and diesel fuel, and storage and insurance costs. The storage factor is applied to the initial cost or purchase price of the implement. In the case of obsolete equipment, the storage and insurance cost is 3 percent of the present value of the machine and cannot be altered.

TABLE 1: FARM MACHINERY

Farm machinery costs may be divided into two categories: (1) fixed costs and (2) operating costs. Fixed costs or ownership costs include depreciation, interest on investment, insurance and housing. Ownership costs are fixed for each year, regardless of how much the machinery is used. Therefore, the impact of fixed costs per hour or per acre on an enterprise will be reduced as the level of use increases.

Operating costs vary with the use of the machine and include fuel, lubrication, repairs and maintenance. Table 1 of the program output reports the costs of the machinery complement per farm (Appendix 1). This table is derived from the hours the machine is used annually.

Depreciation

Depreciation is defined as the loss in value of a machine, tractor, truck or other asset over time. In the ACRES model, the declining balance approach is used in estimating depreciation. This method closely approximates the actual value of a machine.

$$\text{Depreciation} = [((1-\text{dep.rate})^{(\text{age}-1)}) - (1-\text{dep.rate})^{(\text{age})}] \times \text{Price}$$

With the declining balance method, the amount of depreciation of a machine varies with its age. However, the annual percentage of the remaining value is the same. In the Economics Branch, depreciation is usually calculated using a 15 percent rate on the remaining value on tractors and self-propelled equipment. A factor of 10 percent is used for all other types of implements except on obsolete equipment, where no depreciation is charged.

Interest on Investment

Interest costs have two components depending on whether the farm equipment is paid with cash or borrowed funds. In either case, it is appropriate to add a cost to cover the interest. The cost of financing a machine purchased on credit represents a direct cash cost. For the purposes of this model, the interest rate chosen to reflect debt servicing costs is the average bank prime lending rate plus 1 percent. If a machine is purchased with cash, there is no interest or debt charge but there is a lost opportunity. The money invested in a machine could be earning interest if it were put to an alternative use. The interest rate used to compute the interest on the equity portion is the average rate paid by banks on deposit accounts. In the ACRES model a 30:70 debt-equity ratio is assumed. (These factors may vary depending on the specific situation)

Interest on equity is:

$$Equity_i = [(1 - \text{dep. rate})^{(age)}] \times Price \times Equity\ Interest\ Rate \times Equity\ Proportion$$

Interest on debt is computed using a similar method.

Insurance and Housing

Insurance is used to protect the operator from loss of implements due to fire or other hazards. It is necessary to provide storage for machines to limit deterioration. Even if no storage is provided, a cost should be included since exposure will increase the repair rate. Storage and insurance costs are estimated by taking 1.5 percent of the purchase price. A specific factor, other than the 1.5 percent, may be used depending on the particular case.

Fuel

Fuel costs are based on the rates of fuel consumption and price. Normally, the fuel consumption rates used in the model are those provided by users. However, they can also be based on horsepower ratios. For example, research indicates that tractors operate at about 55 percent of their maximum power.[1] It has been determined that a diesel or gasoline tractor will consume an average of 0.038 imperial gallons per hour per maximum PTO horsepower. Hourly costs for fuel can be estimated using the PTO HP rating by factoring the number of gallons used per hour of PTO horsepower and multiplying the result by the price of the fuel. An additional 15 percent is added to fuel costs to cover lubricants.

$$Cost = Price \times 4.545 \times Consumption/hr - 100 \times 1.15 \times Hours\ Annual\ Use$$

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[1] Agricultural Engineering Department, University of Illinois.

Repairs

Repair and maintenance costs include parts, labor and the facilities necessary to keep the machinery in good working order. It is difficult to predict repair costs for individual machines. During the past 10 years, considerable research on farm machinery repairs has been conducted. Repair estimates on machinery used in the ACRES model vary from 9¢ to $1.00 per hour per $1,000 of purchase price. These estimates are based on the research of Buth and adapted from information published by the American Society of Agricultural Engineers.[1]

In theory, increased use of machines will result in higher repair rates. However, for purposes of simplicity, repair rates for this model are assumed to occur at the mid-point of the life of the machine. The figures that are input should represent an average repair cost per hour of use.

Repairs in Table 1 are computed by multiplying the hourly repair rate (input) by the annual hourly use of the machine. If an annual repair cost is input, then that amount is used in Table 1. Figures for Tables 2 and 3 are calculated based on the hours used.

Obsolete Equipment

An obsolete machine is one that is still in use even though its mechanical life is judged to be over. The machine may be 10 to 15 years old depending on its kind and type. For obsolete equipment, costs are estimated differently. The machine will be completely depreciated. Also insurance and repair costs will be less. Interest on equity is computed by multiplying the present value of the machine by the bank deposit rate and the proportion of equity. Interest on debt is also calculated this way. Generally, the tasks performed by an obsolete machine will be light and it will be used less often. All these factors will influence both the ownership and operating costs.

Farm Trucks

With the exception of the cost of the licence, insurance and repairs, the cost for farm trucks is calculated in a manner similar to that of other farm machines. Licence and insurance are determined by the gross weight of the truck and are based on information provided by the Ontario Ministry of Transportation and Communications. Both of these annual costs are input by the user. The repair cost for trucks is always based on an annual total cost, not an hourly rate.

Truck usage is determined by entering the miles of farm and annual use. The program divides this figure by 30 to convert the miles to hours of use. All implement costs including trucks are expressed on an hourly basis.

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[1]Dirk Buth, Cost of Owning and Operating Farm Machines. Factsheet, Agdex 825. (Toronto: Ontario Ministry of Agriculture and Food, 1981).

ASAE Farm Machinery Management Committee, "Farm Machinery Costs and Use", Agricultural Engineer's yearbook (St. Joseph, Michigan: American Society of Agricultural Engineers, annual), pp 279-283.

TABLE 2: ENTERPRISE COSTS

Table 2 is prepared the same way as Table 1 except the hours the machine is used for the enterprise, form the basis of the calculations.

TABLE 3: HOURLY COSTS

An hourly rate for each machine, used in a particular run of the ACRES model, is calculated. Determining hourly rates is important as they are used with hourly rates of labor to estimate the cost of each field operation performed on the crop. Table 3 is computed the same way as Tables 1 and 2 but the costs are reduced to a cost per hour.

Following Table 3, the management charge, overhead charge, the yield of the commodity and the expected price are listed. These factors are used in computing the remainder of the tables.

TABLE 4: OPERATION COSTS

Table 4 is probably the most useful table in the report as it lists the detailed machine, labor and other costs for each operation specified. The costs per hour from Table 3 are combined with the accomplishment rates per hour to compute tractor, machine, labor and other costs. Table 4 is discussed in detail.

The machinery combinations are specified on the input form along with the accomplishment rates, labor requirements and labor class, for each operation. The hours per acre which includes machine and labor (hired and operator) are computed from the accomplishment rates and multiplied by the appropriate hourly cost items to establish the total cost.

Machine Numbers

Machine numbers are the identification numbers of the machines specified on the input cards and in Tables 1, 2 and 3. If the user tries to use a machine number in an operation that does not appear in Table 3, the program terminates with an error message. Conversely, a machine appearing in Table 3 does not have to be used in an operation and a machine may be used more than once. As well, one tractor may be used to pull up to three implements.

Hours per Acre

Machine -- This amount is computed by dividing the machine hours used by the enterprise acreage and multiplying it by the number of times the operation is performed. If the enterprise acreage is zero, then the division is not performed and the machine hours are set at zero.

Hired -- The labor hours specified are divided by the enterprise acreage and multiplied by the number of times the operation is performed. If the enterprise acreage is zero, then the division is not performed and the labor hours are set at zero. If the labor class was specified as 2 through 9 then the labor is treated as hired labor. If class 1 was specified then it is treated as operator labor. The hired wage rate should include an allowance for CPP, UI, other benefits and room and board if appropriate.

Operator -- Computation of operator labor is the same as hired labor.

Tractors

Fixed Costs -- If a tractor is used in the operation, then the costs per hour from Table 3 are multiplied by the machine hours per acre. Fixed costs are depreciation, interest on equity, interest on debt and a combined storage and insurance charge.

Variable Costs -- Variable costs are fuel and repairs. The fuel and repair costs per hour are multiplied by the hours of machine use and then added to arrive at the variable cost.

Machines

Fixed Costs -- The fixed costs of all the implements specified to be pulled by the tractor are added and multiplied by the machine hours per acre to arrive at a fixed cost for all machines. Fixed costs are depreciation, interest on equity, interest on debt, and a combined charge for housing and insurance. In the case of trucks, charges are computed based on input data for licence, insurance and storage.

Labor Cost

Hired -- The hours of hired labor per acre are multiplied by the wage rate for the class of labor specified.

Operator -- The hours of operator labor per acre are multiplied by the wage rate specified for the operator class. In 1983, the operator wage rate was $6.50 per hour.

Labor Class

The class of labor specified for the operation is listed. If a labor class is specified that is not listed on the labor input section, the program terminates.

Other or Miscellaneous

Any other costs that are not part of a specific operation or not a material may be included on a per acre basis. This may included custom operations, crop insurance, marketing board fees, or any other appropriate charge.

Total Cost

The total cost of each operation includes fixed and variable tractor costs, fixed and variable machine costs, hired and operator labor and other.

A labor summary is printed below Table 4. This lists the class, name, total hours, the rate per hour and the total cost for each class of labor.

TABLE 5: MATERIALS AND COSTS

For most crops, materials include the cost of seed, fertilizer and spray. Other items may include drying fuels, harvesting containers, etc.

The items reported in Table 5 are taken directly from the input section dealing with materials. The input must be expressed on per acre basis. The quantity applied, the number of times and the price per unit are multiplied together to arrive at the total cost per acre.

TABLE 6: REAL ESTATE AND OTHER COSTS

Land Costs

The cost of owning land can be considered as either an opportunity or debt cost depending on whether it is owned or purchased with borrowed funds. In either case, it is necessary to determine a cost by charging an appropriate rate of interest against its value.

Determining an annual cost for land has proven to be contentious. Generally, farmers who purchase land are willing to pay more than can be justified from the anticipated returns from production. Owning land has been perceived as a hedge against inflation. This speculative aspect of purchasing land has contributed to higher market values. Since the potential income comes not only from the crops produced, but also from the eventual sale of the land at higher prices, it is not correct to charge the full cost of current interest rates against the crops grown on it.

Therefore, the interest rate applied to real estate (land and buildings) is calculated in the following manner. An average current lending rate, in this case the Farm Credit Corporation rate,[1] is discounted to remove inflation. The interest rate used is subject to the proviso of not less than 3.5 percent. The 3.5 percent is somewhat arbitrary; however, research indicates that 3.5 percent is the minimum long term rate of return that farmers or investors have been willing to accept.

If a market value per acre is input, then it will be listed in Table 6. Interest is multiplied by the value of the land. Any taxes listed per acre will be shown. If some land is rented, then the rent per acre will be shown and the total cost for the land will be computed based on the proportion owned and the proportion rented. In most cases, the results will be more meaningful if budgets are generated with land either totally rented or owned.

The value of buildings per acre and a depreciation rate were required inputs. The same interest rate that was applied to land is also applied to the value of owned buildings.

If any building is rented on an annual basis such as a storage bin, then the annual cost is entered along with the acreage owned and rented. The sum of owned and rented acreage is divided into the annual cost paid to get the rent per acre for buildings.

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[1]Gordon Framst, A Method for Determining Enterprise Land Costs (Toronto: Economics Branch, Ontario Ministry of Agriculture an Food), 1981.

Interest on Operating Capital

In the production of any crop there is a need for capital to purchase materials, fuel, and pay hired labor. The need for operating capital usually begins early in the spring and continues until such time as the grower is able to market his crops which may be in the fall, winter or spring of the following year. Some growers borrow all of their capital while others borrow part of their operating capital and obtain the rest from their cash reserves.

In order to account for this expense, interest on operating capital is included as a cost component and calculated in the following manner. An interest rate, consisting of the prime lending rate of chartered banks plus 1 percent is applied to cash costs for the average number of months that money will be in use before the grower begins selling the crop. Depending on the crop, this time interval may range from three to nine months or longer.

Interest on operating capital is made up of interest charged on the total cost of materials (from Table 5) plus tractor operating costs, machine operating costs, (Table 4) hired labor and other costs (Table 4). This total is multiplied by the cost of debt and the portion of a year the capital is required.

Overhead

Certain costs such as telephone, electricity, accounting services, and farm maintenance are usually thought of as fixed overhead expenses. As such, they cannot be directly charged in total to any enterprise. However, if production costs for individual enterprises are estimated, general farm expenses such as these should be allocated among the different enterprises. Such expenses vary greatly from farm to farm according to the crops grown, the grower's management style, and the manner in which the farm business is organized. The method of handling overhead costs in the ACRES program is to enter a user specified amount per acre.

Management Fee

An allowance for management is included in all cost of production estimates. The management fee is usually at the rate of 5 percent of the estimated gross returns. This figure may be altered by the user. Zero could be entered if one wished to determine a residual return for management.

TABLE 7: OPERATING AND FIXED COSTS

Operating Costs

Operating or variable costs are those which change with the level of production. In contrast to fixed costs they are not a factor when there is no production. Operating costs are made up of some of the tractor and machinery costs, hired labor, custom work, materials, marketing board fees, utilities and interest on operating capital.

Fixed Costs

Fixed costs refer to costs that do not vary according to the level of production for a given planning period. However, they do vary when major changes are

made in a farm plan. Fixed resources are sometimes referred to as lumpy inputs because when they vary they do so in large quantities. Costs are affected proportionately. For example, the purchase of a new tractor will affect depreciation charges substantially. Fixed costs are defined as operator labor, ownership costs associated with farm machinery, building and land costs which includes rent, taxes and overhead.

Gross Margin

The gross margin of an enterprise is defined as the value of its production (gross returns) less its variable or operating costs. The gross margin cannot be used as a measure of profitability. In the long run, all fixed costs must be covered for an enterprise to be profitable. When compared with averages or standards, it is a useful measure of technical efficiency as the farmer assesses the use of the variable inputs such as fertilizer, sprays, and labor. Gross margin can also be a useful tool for farm planning.

Summary

The structure of Table 7 is reproduced under the Item heading. The definition or source of each item in Table 7 is listed. For example, the cost of materials is taken from Table 5.

Item	Source or Definition
Expected gross returns	Yield x price
Operating costs	
Tractor	(repairs + fuel) x hours/acre, Table 4
Machinery & trucks	(repairs + fuel) x hours/acre, Table 4
Materials	Total of Table 5
Hired labor	Total from Table 4
Custom or other	Other or miscellaneous from Table 4
Interest on operating capital	Identical item, Table 6
Total	Sum of above costs
Fixed costs	
Tractor	Fixed costs, Table 4
Machinery and trucks	Fixed costs, Table 4
Operator labor	Total, Table 4
Management allowance	Table 6
Interest on land	Table 6
Taxes	Table 6
Land rent	Table 6
Building rent	Table 6
Overhead	Building depreciation + building interest + other overhead, Table 6
Total	Sum above costs
Total all costs	Sum fixed and operating costs
Margins and ratios	Self-explanatory

The costs per hectare are the acreage figures multiplied by 2.47105 and the costs per unit are the acreage figures divided by the yield.

TABLE 8: CASH AND NON-CASH COSTS

Cash Costs

Cash costs include tractor operating expenses such as fuel, lubricants, repairs and maintenance. Materials and services such as custom work, hired labor and cash overhead are also included. Cash overhead expenses are defined as all utilities, taxes, interest on operating capital, crop and other forms of insurance.

Non-cash Costs

Non-cash costs are depreciation on buildings and equipment, operator labor, and an allowance for management.

Summary

Item	Source or Definition
Expected gross returns	Yield x price
Cash costs	
Tractor	Operating costs, Table 4
Machinery & trucks	Repairs + fuel + truck insurance + truck licence
Materials	Total of Table 5
Custom or other	from Table 4
Interest on operating capital and equipment	Same item Table 6 + interest on the debt portion of tractors and machines, Table 3
Hired labor	Total, Table 4
Land	
Taxes	Table 6
Rent	Table 6
Other overhead	Table 6
Total	Sum of above costs
Non-cash costs	
Depreciation and housing	
Tractor	Depreciation and storage, Tables 3 and 4
Machines and trucks	Depreciation and storage, Tables 3 and 4
Buildings	Depreciation, Table 6
Interest on equity	
Tractor	Interest on equity portion, Tables 3 and 4
Machines and trucks	Interest on equity portion, Tables 3 and 4
Land and building	Interest on land + interest on buildings, Table 6
Operator labor	Total, Table 4
Management allowance	Table 6
Total	Sum non-cash costs
Total	Sum cash + non-cash costs
Return over cash costs	Gross returns - cash costs

PART III: A C R E S INPUT FORM

PROGRAM DESCRIPTION

The ACRES program (Agricultural CRop Enterprise System) computes ownership and operation costs of machinery on a per farm, per crop, per acre and per unit produced, for the enterprise under study. The program is not restricted to particular enterprises but is flexible to handle virtually any crop. (Livestock enterprises are not implemented in ACRES.)

The machinery cost portion of the program calculates the cost of owning and operating farm machinery. The data for machinery costs result from crop cost studies conducted through on-farm interviews, engineers and other sources. The machinery cost portion of ACRES may be run for an individual farm or in a generalized budgeting sense where the machines specified may represent a typical or average situation.

A base of data for machinery has been assembled and this is included in a table in Appendix 2. Users may select a complement of machinery from this list as well as combine selections with their own machinery data. Detailed use of this Master Machinery table is discussed in Section 2 -- Alternate Machinery Section.

For each operation specified the crop cost portion of the program calculates per acre:

1. Fixed and variable costs for tractors, implements and trucks. The fixed costs include depreciation, interest and storage charges while variable costs include repairs and fuel.

2. Labor costs divided into as many as nine classes. Each class of labor is assigned a different wage rate and each class is associated with a specific operation.

3. Other costs. This could include custom charges (with or without a labor component), drying charges, storage, or any other appropriate cost.

4. Materials costs. The costs of seed, fertilizer, pesticides, and any other materials used in the production of the commodity under study.

5. Real estate and other costs. The value of land and buildings is input and the appropriate depreciation and interest charges are computed. Allowance is also made for renting land and buildings. As well, this section includes a charge for interest on operating capital, a charge for miscellaneous overhead such as accounting, telephone, subscriptions, etc., and an allowance for management.

6. Summary of costs and returns. Cash, non-cash, fixed and operating costs are summarized on a per acre, per hectare and per unit of yield such as bushels, hundredweight, etc..

INPUT FORM

The complete input form is reproduced in Appendix 3. Six sections are required for each complete run of the system. If the user only wishes to compute machinery costs, then only Sections 1 and 2 need to be run.

Section 1 -- Implementation Section

Card #	Column	
1	1-4	IMPL
	6-77	A title for the machinery tables is useful and it is a good idea to include the current date as part of the title. This title will be printed at the top of the first three tables.
2	1- 5	The bank deposit rate, used to calculate equity cost, expressed as a percent; e.g., for 12.5 percent, 12.5 should be entered.
	6-10	The prime rate of interest, used to calculate debt cost, expressed as a percent; e.g., for 15 percent, 15.0 should be entered.
	11-15	The portion of equity that is assumed in the equipment, expressed as a percent; e.g., for 70 percent, 70.0 should be entered.
	16-20	The portion of debt that is assumed in the equipment, expressed as a percent; e.g., for 30 percent, 30.0 should be entered.
	21-25	The price of gasoline in cents per litre; e.g., 41.2 should be entered.
	26-30	The price of diesel fuel in cents per litre; e.g., 38.7 should be entered.
	31-35	A factor for insurance and storage costs expressed as a percent of the purchase price. Usually 1.5 percent is entered.

Section 2 -- Main Machinery Section

Card #	Column	
1	1-4	MACH
	6-8	A three-digit unique identification number for each machine (no decimal).

10 A code for the type of machine (no decimal):
- 1 = tractors
- 2 = other machines, or
- 3 = trucks.

11-42 A descriptive name of the machine.

43-49 The initial cost or purchase price.

50-55 The age of the machine in years.

56-61 The depreciation rate is expressed as a percentage of the remaining value. The method used for computing depreciation is the declining balance method. Typically, the factor is 15 percent for tractors and other powered equipment, and 10 percent for all other equipment. Obsolete equipment is not depreciated.

62-67 The hours the machine is used annually, and for trucks the annual mileage.

68-73 The hours (miles for trucks) each machine is used on the crop enterprise under study.

2 2 A code to indicate whether the machine is obsolete:
- 0 = obsolete
- 1 = not obsolete.

3-10 The present value of the machine. Enter a value only if the machine is obsolete.

11-18 An hourly repair rate expressed in dollars per hour. This should be based on the number of hours the machine is used, not on what one has to pay mechanics for repairs.

19-26 An annual repair rate, dollars. Only expressed when hourly rate is not given. This figure will be divided by hours of annual use and hours of enterprise use as appropriate.

27 Fuel type:
- D = diesel
- G = gas
- (blank) = non-powered machines.

28-35 Fuel consumption in gallons per hour for all equipment except trucks which is miles per gallon.

36-43 Annual insurance cost in dollars for trucks.

44-51 Annual licence fees in dollars for trucks.

52-59 Annual storage cost in dollars for trucks.

NOTE: These pairs of cards may be repeated for up to 49 individual machines. The section ends with ENDA and 9999 punched on two cards.

Section 2 -- Alternate Machinery Section

The data required for the machinery section is quite detailed. It is unlikely that all users would have this information readily available. To facilitate users a table or Master Machinery File has been prepared and included in Appendix 2.

Instead of entering the code MACH on the input card, merely enter RMMF (Read Master Machinery File) and the three digit identification number for the machine. This alternative reduces the tedium of entering the same data repeatedly when running several budgets.

Check the data carefully in the Master Machinery File to be sure the item is what you want. If you cannot find a machine in the table, then you will have to enter all the details as described in the Main Machinery Section.

If you want to alter either the annual or crop hours of use from what is printed in the Master Machinery File, then you may do so. For changes other than these two you will have to enter all the data, in the manner described in the Main Machinery Section.

You may choose as many items as you wish from the Master Machinery File, using the RMMF code, and include your own machines using the MACH code (subject to a maximum of 49 machines in total). RMMF and MACH may be combined in any order. If you specify RMMF and an identification number that is not in the Master Machinery File, then the program terminates with an appropriate message.

Section 3 -- Budget Section

Card #	Column	
1	1-4	BUDG
	6-77	The title to be written at the top of Tables 4 through 8. It is a good idea to include the current date in the title for future reference.
2	1-7	A charge for management, expressed as a percent. This factor will be multiplied by the gross returns per acre.
	8-14	A charge for other overhead, expressed in dollars per acre. It could represent non-specific items such as telephone, subscriptions, etc.
	15-21	The number of months operating capital will be required. This is necessary so that a charge will be included for interest on operating capital.
	22-28	The yield per acre of the crop.
	29-35	The expected price of the crop.
	36-43	The unit in which yield and price are expressed. This may be BUSHEL, TONNE, CRATE, etc.

NOTE: The previous three items must be consistent. The yield and price are multiplied to generate expected gross returns. For example, if the commodity is corn, enter:

Yield = 90.
Price = 2.25
Unit = BUSHEL

This data will result in gross returns of $202.50 per acre. One could have entered:

Yield = 202.50
Price = 1.00
Unit = BUSHEL

This would also yield $202.50 per acre, but the last two tables compute costs on an acre, hectare and unit basis. Because all previous figures are on an acre basis, sensible results will be printed only if the yield is expressed on a per acre basis.

Labor Component

Up to nine classes of labor may be specified. The first class will always be treated as operator labor by the program. It will be treated as a fixed cost. The rate at which labor should be paid is required input.

Card #	Column	
1	1	The code for operator labor. It will always be 1 without decimal.
	2-9	The name of the labor class. The name OPERATOR is recommended (although not mandatory).
	10-16	The rate at which operator labor should be paid, dollars per hour.
	17	The code for the second class of labor. This class plus the remaining classes of labor are all treated as hired labor. They will show up as an operating cost.
	18-25	A name for this labor class.
	26-32	The rate at which this labor class is paid expressed as dollars per hour.

NOTE: The remaining labor classes are treated the same as labor class two.

NOTE: Even if no entries are made on the second card, this must be included in the input as a blank card.

Section 4 -- Operations Section

The OPERations section of the input data calls for the specification of individual operations used to till, plant, cultivate, and harvest the crop under study. Implements pulled in tandem may be specified as one operation. Up to three machines and one tractor may be listed as one operation. In the case of tandem operations, labor for one person (operator or hired) will be computed.

Some operations may be included that require none of the owner's machinery, i.e., custom farm operations or drying charges. This item would be entered as a cost per acre in columns 36-40 of the second operation card (described below).

Card # Column

1 1-4 OPER

6-29 The name of the operation to be performed.

2 1-3 The ID number of the tractor used in this operation. If no tractor is used leave this blank.

4-6 The ID number of any implement used with the tractor. In the case of a self-propelled implement such as a combine, enter its ID number here or in 7-9, or 10-12.

7-9 The ID number of a second implement pulled by the tractor.

10-12 The ID number of a third implement pulled by the tractor.

NOTE: The ID numbers in this section must agree with the ID's used in the MACH section. For sensible results do not specify a non-tractor to pull another implement.

15-19 The number of times per year that the operation is performed. This figure is multiplied by tractor and implement ownership and operating costs and/or labor costs to obtain the total machinery and labor costs. This should be zero if only other or materials costs are involved (cols. 36-40).

20-24 The number of acres on which each operation is performed. You may enter 1. acre or the actual number of enterprise acres, i.e., 150.

25-29 The number of machine hours per occasion of the operation. This figure should be consistent with the previous entry (number of acres). In other words, enter the time it takes to perform the operation on 1 acre or the total time it takes to perform the operation on all the enterprise acreage.

NOTE: In the case of a truck, be sure to enter the hours of use, not the miles. The program initially converts the miles of use in the MACH section to hours by dividing by 30. For example, if you enter 2800 enterprise miles in the MACH section, then enter 93.3 or (2800 ÷ 30) in the OPER section.

30-34 The hours of labor required for the operation. Be consistent with the two previous entries -- enter all three items on an acre basis or on a total enterprise acreage basis. For most operations labor hours should be greater than the machine hours. This allows for driving to fields, servicing machines, filling hoppers, etc.

35 Enter the class of labor used to perform the operation. Select a code from the labor section. If the owner performs the operation enter 1; if one of the hired labor classes performs the operation, then enter the appropriate class code.

If an operation requires two or more classes of labor, enter the second class of labor information as another operation (without specifying the machines).

36-40 Any "other" costs shown on a per acre basis. These may be entered as part of the operation section. (The next section, MATErials, is designed to itemize materials like fertilizer, sprays, etc.) This is a good place for custom operations.

NOTE: These pairs of OPERation cards may be repeated up to 49 times.

1-4 ENDA End the section with this pair of cards.
9999

Section 5 -- Materials Section

The MATErials section allows the user to input and itemize all the materials that would be used in a typical budget. Items should be grouped and up to five subtotals may be called for. For example, one may want a subtotal for all fertilizer and sprays. Up to 49 separate materials may be specified per budget.

Card # Column

1 1-4 MATE

6-30 The name of the material.

31-57 The type of material or any more detailed description such as, 46-0-0 Urea.

2 1-7 The quantity applied per acre.

8-14 The number of times the material is applied or used.

15-21 The price per unit of the material.

22-29 The unit in which the material is measured. This is a name of up to eight characters in length.

NOTE: The first three items are multiplied together to arrive at a total cost per acre. The units are included for clarity and future reference.

After any number of items is listed, a subtotal may be requested by including two cards with SUBT and 9999. No other parameters are required.

These pairs of materials cards may be repeated up to 49 times.

The section ends with ENDA and 9999.

Section 6 -- Real Estate Section

Card #	Column	
1	1-4	REAL
	6-13	The value of land per acre without buildings.
	14-21	The value of buildings per acre.
	22-29	The average building depreciation rate, in percent, per year.
	30-37	The interest rate applicable to real estate. This rate should represent a long-term average return to capital invested in real estate. The value entered here will be applied to both land and buildings. Research has shown the value of this variable to lie in the 3.5 to 7.0 percent range during recent years.
	38-45	The average tax per acre assessed to real estate, net of any rebate.
2	1-8	Enterprise acreage owned. You may enter 1 acre.
	9-16	Enterprise acreage rented. You may enter 1 acre.
	17-24	Rent paid on land, dollars per acre.
	25-32	Rent paid for buildings or storages, annual cost.

NOTE: To end the budget include a card with ENDJ punched in columns 1-4. You may wish to compute another budget using the same machinery complement but different operations, if so, include a BUDG card and new OPER, MATE and REAL sections as described above.

If you wish to run a completely new budget, with another machinery set, then end the REAL section with NEWJ punched in columns 1-4, followed by the usual sections.

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APPENDIX I

OUTPUT

```
WELCOME TO A C R E S --AGRICULTURAL CROP ENTERPRISE SYSTEM-- COURTESY OF ECONOMICS BRANCH, OMAF.

A LISTING OF YOUR INPUT DATA FOLLOWS;

   IMPL MACHINES GRAIN CORN,ONTARIO,JUNE 25,1984
   7.75 13.  70.  30.  36.0 36.0 2.
   RMMF 101
   RMMF 103
   RMMF 204
   RMMF 214
   RMMF 224
   RMMF 234
   RMMF 241
   RMMF 350
   RMMF 402
   RMMF 563
   RMMF 304
   RMMF 424
   RMMF 502
   RMMF 561
   ENDA
   9999
   BUDG GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984
   5.     15.    6.     94.    3.16   BUSHEL
   1OPERATOR6.50
   2SKILLED 5.75
   OPER FALL PLOW
   101204         1.   125. 40.  40.  1
   OPER DISC
   101214         1.   125. 15.  15.  1
   OPER SPREAD FERTILIZER
   103350         1.   125. 12.  12.  1
   OPER SPRAY HERBICIDE
   103402         1.   125. 15.  15.  1
   OPER FD CULT HARROW PACK
   101224234241   1.   125. 16.  16.  2
   OPER HAUL SEED
   101563         1.   125. 6.   6.   2
   OPER PLANTING
   103304         1.   125. 30.  30.  1
   OPER ROW CULTIVATE
   103424         1.   125. 16.  16.  1
   OPER APPLY N AND HERB RENT APPL
   101            1.   125. 15.  15.  11.60
   OPER COMBINING
      502         1.   125. 40.  40.  1
   OPER HAUL TO STORAGE
   103561         1.   125. 40.  40.  2
   OPER USE OF EXTRA WAGONS
      561         1.   125. 80.
   OPER CUSTOM DRYING CHARGE
                                      30.00
   OPER CUSTOM STORAGE 1/2 CROP
                                      8.08
   OPER CROP INSURANCE
                                      7.00
   ENDA
   9999
   MATE SEED                    24000 KERNELS
```

```
7.5    1.      2.88   KG
SUBT
9999
MATE FERTILIZER  SEEDBED       8-32-16
70.    1.      .29    KG
MATE FERTILIZER SIDE DRESS     28-0-0
200.   1.      .190   KG
SUBT
9999
MATE HERBICIDE                 LASSO
2.25   1.      6.20   KG
MATE HERBICIDE                 ATRAZINE 80WP
.75    1.      6.30   KG
SUBT
9999
MATE INSECTICIDE               COUNTER
3.     1.      3.10   KG
MATE SEED TREATMENT            DL
35.    1.      .015   GR
SUBT
9999
ENDA
9999
REAL 1200.                     7.1      5.15
125.
ENDJ
```

FACTORS USED IN THIS BUDGET:

EQUITY COST(DEPOSIT RATE): 7.75%
DEBT COST(PRIME RATE): 13.00%

PERCENT EQUITY: 70.00%
PERCENT DEBT: 30.00%

GASOLINE PRICE: 36.00CENTS/L
DIESEL PRICE: 36.00CENTS/L

STORAGE FACTOR: 2.00%

TABLE 1.--MACHINE COSTS PER FARM: MACHINES GRAIN CORN,ONTARIO,JUNE 25,1984

MACHINE NO.	----MACHINE NAME----	PRICE	AGE	ANNUAL USE (HRS)	COST PER FARM -- DOLLARS -- DEPREC'N	INTEREST EQUITY	INTEREST DEBT	HOUSING	REPAIRS	FUEL	TOTALS
101	TRACTOR 140 H.P.	44000.	5.	750.	3445.24	1059.12	761.40	880.00	2970.00	8467.33	17583.09
103	TRACTOR 80 H.P.	24500.	5.	575.	1918.37	589.74	423.96	490.00	1265.00	3245.81	7932.88
204	PLOW 4 FURROW	8300.	5.	200.	544.56	265.88	191.14	166.00	796.00	0.0	1963.58
214	DISC 21'	8200.	5.	100.	538.00	262.68	188.84	164.00	394.00	0.0	1547.52
224	FIELD CULT.-20'	4000.	5.	100.	262.44	128.14	92.12	80.00	192.00	0.0	754.70
234	HARROW 20'	700.	5.	100.	45.93	22.42	16.12	14.00	34.00	0.0	132.47
241	PACKER 20'	1400.	5.	100.	91.85	44.85	32.24	28.00	67.00	0.0	263.94
360	FERTILIZER SPREADER-FIELD CR	1000.	5.	75.	65.61	32.03	23.03	20.00	75.00	0.0	215.67
402	SPRAYER 21' BOOM	2100.	5.	100.	137.78	67.27	48.36	42.00	174.00	0.0	469.41
563	WAGON, FLAT	1000.	5.	175.	65.61	32.03	23.03	20.00	35.00	0.0	175.67
304	CORN PLANTER 4-ROW	9100.	5.	75.	597.05	291.51	209.56	182.00	341.25	0.0	1621.37
424	ROW CULTIVATOR 4-ROW	1800.	5.	100.	118.10	57.66	41.45	36.00	86.00	0.0	339.21
502	COMBINE	90100.	5.	300.	5911.46	2886.27	2074.92	1802.00	6000.00	3386.93	22061.57
561	WAGON, V-BOX	1400.	5.	175.	91.85	44.85	32.24	28.00	49.00	0.0	245.94
	TOTAL	197600.			13833.83	5784.45	4158.41	3952.00	12478.25	15100.07	55307.00

TABLE 2.--MACHINE COSTS PER CROP: MACHINES GRAIN CORN,ONTARIO,JUNE 25,1984

MACHINE NO.	----MACHINE NAME----	PRICE	AGE	CROP USE (HRS)	COST PER CROP -- DEPREC'N	INTEREST EQUITY	INTEREST DEBT	HOUSING	REPAIRS	FUEL	TOTALS
					DOLLARS						
101	TRACTOR 140 H.P.	44000.	5.	1.	4.59	1.41	1.02	1.17	3.96	11.29	23.44
103	TRACTOR 80 H.P.	24500.	5.	1.	3.34	1.03	0.74	0.85	2.20	5.64	13.80
204	PLOW 4 FURROW	8300.	5.	1.	2.72	1.33	0.96	0.83	3.98	0.0	9.82
214	DISC 21'	8200.	5.	1.	5.38	2.63	1.89	1.64	3.94	0.0	15.48
224	FIELD CULT.-20'	4000.	5.	1.	2.62	1.28	0.92	0.80	1.92	0.0	7.54
234	HARROW 20'	700.	5.	1.	0.46	0.22	0.16	0.14	0.34	0.0	1.32
241	PACKER 20'	1400.	5.	1.	0.92	0.45	0.32	0.28	0.67	0.0	2.64
350	FERTILIZER SPREADER-FIELD CR	1000.	5.	1.	0.87	0.43	0.31	0.27	1.00	0.0	2.88
402	SPRAYER 21' BOOM	2100.	5.	1.	1.38	0.67	0.48	0.42	1.74	0.0	4.69
563	WAGON, FLAT	1000.	5.	1.	0.37	0.18	0.13	0.11	0.20	0.0	0.99
304	CORN PLANTER 4-ROW	9100.	5.	1.	7.96	3.89	2.79	2.43	4.55	0.0	21.62
424	ROW CULTIVATOR 4-ROW	1800.	5.	1.	1.18	0.58	0.41	0.36	0.86	0.0	3.39
502	COMBINE	90100.	5.	1.	19.70	9.62	6.92	6.01	20.00	11.29	73.54
561	WAGON, V-BOX	1400.	5.	1.	0.52	0.26	0.18	0.16	0.28	0.0	1.40
	TOTAL	197600.			52.01	23.98	17.23	15.47	45.64	28.22	182.55

TABLE 3.--MACHINE COSTS PER HOUR: MACHINES GRAIN CORN,ONTARIO,JUNE 25,1984

MACHINE NO.	----MACHINE NAME----	PRICE	AGE	HOURS USE (HRS)	COST PER HOUR DOLLARS DEPREC'N	INTEREST EQUITY	INTEREST DEBT	HOUSING	REPAIRS	FUEL	TOTALS
101	TRACTOR 140 H.P.	44000.	5.	1.	4.59	1.41	1.02	1.17	3.96	11.29	23.44
103	TRACTOR 80 H.P.	24500.	5.	1.	3.34	1.03	0.74	0.85	2.20	5.64	13.80
204	PLOW 4 FURROW	8300.	5.	1.	2.72	1.33	0.96	0.83	3.98	0.0	9.82
214	DISC 21'	8200.	5.	1.	5.38	2.63	1.89	1.64	3.94	0.0	15.48
224	FIELD CULT.-20'	4000.	5.	1.	2.62	1.28	0.92	0.80	1.92	0.0	7.54
234	HARROW 20'	700.	5.	1.	0.46	0.22	0.16	0.14	0.34	0.0	1.32
241	PACKER 20'	1400.	5.	1.	0.92	0.45	0.32	0.28	0.67	0.0	2.64
350	FERTILIZER SPREADER-FIELD CR	1000.	5.	1.	0.87	0.43	0.31	0.27	1.00	0.0	2.88
402	SPRAYER 21' BOOM	2100.	5.	1.	1.38	0.67	0.48	0.42	1.74	0.0	4.69
563	WAGON, FLAT	1000.	5.	1.	0.37	0.18	0.13	0.11	0.20	0.0	0.99
304	CORN PLANTER 4-ROW	9100.	5.	1.	7.96	3.89	2.79	2.43	4.55	0.0	21.62
424	ROW CULTIVATOR 4-ROW	1800.	5.	1.	1.18	0.58	0.41	0.36	0.86	0.0	3.39
502	COMBINE	90100.	5.	1.	19.70	9.62	6.92	6.01	20.00	11.29	73.54
561	WAGON, V-BOX	1400.	5.	1.	0.52	0.26	0.18	0.16	0.28	0.0	1.40
	TOTAL	197600.			52.01	23.98	17.23	15.47	45.64	28.22	182.55

MORE FACTORS USED IN THIS BUDGET:

CHARGE FOR MANAGEMENT:	5.00%
CHARGE FOR OVERHEAD:	$ 15.00 PER ACRE
EXPECTED YIELD:	94.00 BUSHEL PER ACRE
EXPECTED PRICE:	$ 3.16 PER BUSHEL

TABLE 4.--OPERATION COSTS PER ACRE: GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984

LINE NO.	OPERATION(S)	MACHINE NOS.	HOURS PER ACRE MACH.	HIRED	OPR.	TRACTOR FIXED	VAR.	MACHINES FIXED	VAR.	LABOR COST HIRED	OPR.	LAB CLS	OTHER/ MISC.	TOTAL COSTS
1	FALL PLOW	(101)(204)	0.32	0.0	0.32	2.62	4.88	1.87	1.27	0.0	2.08	1	0.0	12.72
2	DISC	(101)(214)	0.12	0.0	0.12	0.98	1.83	1.38	0.47	0.0	0.78	1	0.0	5.44
3	SPREAD FERTILIZER	(103)(350)	0.10	0.0	0.10	0.57	0.75	0.18	0.10	0.0	0.62	1	0.0	2.22
4	SPRAY HERBICIDE	(103)(402)	0.12	0.0	0.12	0.72	0.94	0.35	0.21	0.0	0.78	1	0.0	3.00
5	FD CULT HARROW PACK	(101)(224)(234)(241)	0.13	0.13	0.0	1.05	1.95	1.10	0.38	0.74	0.0	2	0.0	5.22
6	HAUL SEED	(101)(563)	0.05	0.05	0.0	0.39	0.73	0.04	0.01	0.28	0.0	2	0.0	1.45
7	PLANTING	(103)(304)	0.24	0.0	0.24	1.43	1.88	4.10	1.09	0.0	1.56	1	0.0	10.06
8	ROW CULTIVATE	(103)(424)	0.13	0.0	0.13	0.76	1.00	0.32	0.11	0.0	0.83	1	0.0	3.02
9	APPLY N AND HERB RENT AP	(101)	0.12	0.0	0.12	0.98	1.83			0.0	0.78	1	1.60	5.19
10	COMBINING	(502)	0.32	0.0	0.32			13.52	10.01	0.0	2.08	1	0.0	25.61
11	HAUL TO STORAGE	(103)(561)	0.32	0.32	0.0	1.91	2.51	0.36	0.09	1.84	0.0	2	0.0	6.71
12	USE OF EXTRA WAGONS	(561)	0.64	0.0	0.0			0.72	0.18	0.0	0.0	0	0.0	0.90
13	CUSTOM DRYING CHARGE		0.0	0.0	0.0					0.0	0.0	0	30.00	30.00
14	CUSTOM STORAGE 1/2 CROP		0.0	0.0	0.0					0.0	0.0	0	8.08	8.08
15	CROP INSURANCE		0.0	0.0	0.0					0.0	0.0	0	7.00	7.00
16	TOTALS		2.61	0.50	1.47	11.41	18.30	23.94	13.92	2.86	9.51		46.68	126.62

LABOR SUMMARY, HOURS AND COST PER ACRE

CLASS	NAME	TOTAL HOURS	RATE $ PER HOUR	TOTAL COST
1	OPERATOR	1.46	6.50	9.52
2	SKILLED	0.50	5.75	2.85
	TOTAL . . .	1.96		12.37

TABLE 5.--MATERIALS AND COSTS PER ACRE: GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984

LINE NO.	MATERIAL(S)	TYPE	QUANTITY APPLIED PER ACRE	NO. OF TIMES	PRICE/UNIT	UNIT	COST, $ PER ACRE
1	SEED	24000 KERNELS	7.50	1.00	2.88	KG	21.60
	SUBTOTAL						21.60
2	FERTILIZER SEEDBED	8-32-16	70.00	1.00	0.29	KG	20.30
3	FERTILIZER SIDE DRESS	28-0-0	200.00	1.00	0.19	KG	38.00
	SUBTOTAL						58.30
4	HERBICIDE	LASSO	2.25	1.00	6.20	KG	13.95
5	HERBICIDE	ATRAZINE 80WP	0.75	1.00	6.30	KG	4.72
	SUBTOTAL						18.67
6	INSECTICIDE	COUNTER	3.00	1.00	3.10	KG	9.30
7	SEED TREATMENT	DL	35.00	1.00	0.02	GR	0.52
	SUBTOTAL						9.82
TOTAL	.. ..						108.39

TABLE 6.--REAL ESTATE AND OTHER COSTS PER ACRE: GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984

ITEM	MARKET VALUE	RENT	DEPRECIATION		INTEREST		TAXES	TOTAL
	$	$	%	$	%	$	$	$
LAND								
OWNED	1200.00				7.10	85.20	5.15	
RENTED								
WEIGHTED TOTAL (BASED ON 100.00 % OWNED, 0.0 % RENTED)								90.35
BUILDINGS								
OWNED	0.0		0.0	0.0	7.10	0.0		0.0
RENTED		0.0						0.0
TOTAL LAND AND BUILDINGS								90.35
OTHER COSTS								
INTEREST ON OPERATING CAPITAL (13.00 % FOR 6.00 MONTHS ON $ 190.15)								12.36
OTHER OVERHEAD								15.00
MANAGEMENT ALLOWANCE (5.00 % OF GROSS RETURNS, $ 297.04)								14.85
TOTAL								132.56

TABLE 7.--OPERATING AND FIXED COSTS: GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984

	DOLLARS PER ACRE	DOLLARS PER HECTARE	DOLLARS PER BUSHEL
EXPECTED GROSS RETURNS	297.04	734.00	3.16
OPERATING COSTS			
TRACTOR	18.30	45.22	0.19
MACHINERY AND TRUCKS	13.92	34.40	0.15
MATERIALS	108.39	267.84	1.15
HIRED LABOR	2.86	7.07	0.03
CUSTOM OR OTHER	46.68	115.35	0.50
INTEREST ON OPERATING CAPITAL	12.36	30.54	0.13
TOTAL	202.51	500.41	2.15
FIXED COSTS			
TRACTOR	11.41	28.19	0.12
MACHINERY AND TRUCKS	23.94	59.16	0.25
OPERATOR LABOR	9.51	23.50	0.10
MANAGEMENT ALLOWANCE	14.85	36.70	0.16
INTEREST ON LAND	85.20	210.53	0.91
TAXES	5.15	12.73	0.05
LAND RENT	0.0	0.0	0.0
BUILDING RENT	0.0	0.0	0.0
OVERHEAD (BLDG DEP &INT; OTHER)	15.00	37.07	0.16
TOTAL	165.06	407.87	1.76
TOTAL ALL COSTS	367.57	908.28	3.91
GROSS MARGIN (GROSS-OP. COSTS)	94.53	233.59	1.01
NET RETURNS (GROSS-ALL COSTS)	-70.52	-174.27	-0.74
OPERATING RATIO (OP.COST/GROSS)	0.68		
FIXED RATIO (FIXED COST/GROSS)	0.56		
GROSS RATIO (TOTAL COSTS/GROSS)	1.24		

TABLE 8.--CASH AND NON-CASH COSTS: GRAIN CORN PRODUCTION COSTS,ONTARIO,JUNE 25,1984

	DOLLARS PER ACRE	DOLLARS PER HECTARE	DOLLARS PER BUSHEL
EXPECTED GROSS RETURNS	297.04	734.00	3.16
CASH COSTS			
TRACTOR	18.30	45.22	0.19
MACHINERY AND TRUCKS	13.92	34.41	0.15
MATERIALS	108.39	267.84	1.15
CUSTOM OR OTHER	46.68	115.35	0.50
INTEREST ON OPERATING CAPITAL & EQUIP	17.70	43.73	0.19
HIRED LABOR	2.86	7.07	0.03
LAND			
TAXES	5.15	12.73	0.05
RENT(LAND AND BLDGS)	0.0	0.0	0.0
OTHER OVERHEAD	15.00	37.07	0.16
TOTAL	228.00	563.40	2.43
NON-CASH COSTS			
DEPRECIATION & HOUSING			
TRACTORS	8.03	19.84	0.09
MACHINES AND TRUCKS	14.57	35.99	0.15
BUILDINGS (DEP. ONLY)	0.0	0.0	0.0
INTEREST ON EQUITY			
TRACTOR	1.97	4.87	0.02
MACHINES AND TRUCKS	5.46	13.48	0.06
LAND AND BUILDINGS	85.20	210.53	0.91
OPERATOR LABOR	9.51	23.50	0.10
MANAGEMENT ALLOWANCE	14.85	36.70	0.16
TOTAL	139.58	344.91	1.48
TOTAL	367.58	908.30	3.91
RETURN OVER CASH COSTS	69.04	170.60	0.73

NORMAL END OF BUDGET. THANK YOU FOR RUNNING A C R E S.
IF YOU HAVE ANY PROBLEMS OR QUESTIONS, CALL ECONOMICS BRANCH, OMAF, (416) 965-1064.

APPENDIX 2

MACHINERY FILE

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 54
MACH 101 1TRACTOR 140 H.P.                          44000.5.    15.   750.   1.
  1         3.96                 D6.0
MACH 103 1TRACTOR 80 H.P.                           24500.5.    15.   575.   1.
  1         2.2                  D3.0
MACH 105 1TRACTOR 60 H.P.                           16800.5.    15.   350.   1.
  1         1.51                 D2.0
MACH 107 1TRACTOR 44 H.P.                           11900.5.    15.   300.   1.
  1         1.07                 D1.5
MACH 108 1TRACTOR 40 H.P.                           11200.5.    15.   400.   1.
  1         1.00                 D1.5
MACH 204 2PLOW 4 FURROW                              8300. 5.    10.   200.   1.
  1         3.98
MACH 214 2DISC 21'                                   8200. 5.    10.   100.   1.
  1         3.94
MACH 216 2DISC 12'                                   4290. 5.    10.   100.   1.
  1         2.05
MACH 218 2DISC 8'                                    1000. 5.    10.   100.   1.
  1          .48
MACH 224 2FIELD CULT.-20'                            4000. 5.    10.   100.   1.
  1         1.92
MACH 228 2FIELD CULT.                                1800. 5.    10.    50.   1.
  1          .86
MACH 234 2HARROW 20'                                  700.  5.    10.   100.   1.
  1          .34
MACH 241 2PACKER 20'                                 1400. 5.    10.   100.   1.
  1          .67
MACH 250 2BED SHAPER                                 8200. 5.    10.   200.   1.
  1         2.50
MACH 252 2LEVELLER                                    340.  5.    10.    50.   1.
  1          .16
MACH 304 2CORN PLANTER 4-ROW                         9100. 5.    10.    75.   1.
  1         4.55
MACH 314 2GRAIN DRILL-18'                            5400. 5.    10.    75.   1.
  1         2.7
MACH 322 2TOMATO PLANTER 3-ROW                       3500. 5.    10.   150.   1.
  1         1.68
MACH 323 2TOMATO PLANTER 2-ROW                       2100. 5.    10.    75.   1.
  1         1.05
MACH 326 2VEGETABLE SEEDER 8-ROW                     5430. 5.    10.   100.   1.
  1         2.72
MACH 350 2FERTILIZER SPREADER-FIELD CROPS            1000. 5.    10.    75.   1.
  1         1.00
MACH 352 2FERTILIZER SPREADER-MUCK CROPS              675.  5.    10.    40.   1.
  1          .68
MACH 354 2FERTILIZER SPREADER-FRUIT CROPS             480.  5.    10.    25.   1.
  1         1.00
MACH 356 2SIDE-DRESSER                                175.  5.    10.    75.   1.
  1         1.70
MACH 401 2SPRAYER-MUCK CROPS                         2375. 5.    10.   175.   1.
  1         1.97
MACH 402 2SPRAYER 21' BOOM                           2100. 5.    10.   100.   1.
  1         1.74
MACH 404 2TOMATO SPRAYER                             8200. 5.    10.   200.   1.
  1         6.80
MACH 406 2WEED SPRAYER FRUIT CROPS                   1000. 5.    10.    50.   1.
  1          .83
MACH 408 2ORCHARD SPRAYER                            7000. 5.    10.   100.   1.
  1         5.80
MACH 424 2ROW CULTIVATOR 4-ROW                       1800. 5.    10.   100.   1.
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 1         .86
MACH 434 2ROTARY HOE 4-ROW                          1800. 5.    10.   75.    1.
 1         .86
MACH 451 2PRUNING AID                               4800. 5.    10.   500.   1.
 1         .60                 G.5
MACH 480 2FRONT END LOADER                          2100. 5.    10.   50.    1.
 1         .50
MACH 482 2MANURE SPREADER                           3300. 5.    10.   50.    1.
 1         .80
MACH 502 2COMBINE                                   90100.5.    10.   300.   1.
 1         20.00               D6.0
MACH 512 2CARROT HARVESTER PULL-TYPE                14900.5.    10.   55.    1.
 1         8.94
MACH 516 2ONION HARVESTER PULL-TYPE                 14900.5.    10.   40.    1.
 1         8.94
MACH 519 2ONION PULLER                              1350. 5.    10.   60.    1.
 1         .81
MACH 530 2BUCK RAKE                                 320.  5.    10.   50.    1.
 1         .40
MACH 534 2ROTARY MOWER                              3500. 5.    10.   75.    1.
 1         2.10
MACH 551 2STALK CUTTER  3-ROW                       1400. 5.    10.   75.    1.
 1         .42
MACH 552 2AUGER 6X36'                               1700. 5.    10.   150.   1.
 1         .54
MACH 553 2ELEVATOR 42'                              2600. 5.    10.   150.   1.
 1         .48
MACH 560 2WAGON, FRUIT CROPS                        690.  5.    10.   510.   1.
 1         .14
MACH 561 2WAGON, V-BOX                              1400. 5.    10.   175.   1.
 1         .28
MACH 563 2WAGON, FLAT                               1000. 5.    10.   175.   1.
 1         .20
MACH 564 2WAGON, MUCK CROPS                                     150.   1.
 01000.    .20
MACH 570 2FRUIT CONTAINERS                          114.  2.    30.   6.     1.
 1         .00
MACH 571 2MISC. FRUIT HRVST. EQUPMNT.               1500. 5.    10.   6.     1.
 1                  100.
MACH 601 2FORK-LIFT, TRACTOR MOUNTED                1660. 5.    10.   300.   1.
 1         .15
MACH 660 2COOLING EQUPT. MUCK CROPS                 16800.5.    10.   100.   1.
 1                  730.
MACH 662 2COOLING EQUPT. FRUIT                      2100. 5.    10.   20.    1.
 1                  63.
MACH 701 3TRUCK, MUCK CROPS                         6975. 5.    15.   5000.  1.
 1         2.02               G6.6      150.      120.    150.
MACH 702 3TRUCK, 1-TON                              10500.5.    15.   5000.  1.
 1                  500.     G10.      300.      100.    50.
```

APPENDIX 3

INPUT FORM

A C R E S

Agricultural Crop Enterprise System

User's Input Form

CROPS: _____ YEAR: _____

_____

_____

_____

NAME OF USER: _____

DATE: _____

Economics Branch
Ontario Ministry of Agriculture and Food
Legislative Buildings
Queen's Park
Toronto, Ontario
M7A 1B6

INPUTS

Six sections are required for each complete run of the system. If the user only wishes to compute machinery costs, then only the IMPLEMENTATION and MACHINERY sections need be run.

IMPLEMENTATION SECTION

Be sure to include decimal points for all numeric data. Include the date in the title for future reference.

	Card Number One	Card Number Two						
	Title: For Machinery Tables	Bank Deposit Rate	Prime Rate	Equity Portion	Debt Portion	Gasoline Price	Diesel Price	Insurance & Housing Factor
1-4	6-77	1-5	6-10	11-15	16-20	21-25	26-30	31-35
IMPL								

MACHINERY SECTION

All variables require decimal points except the Machine ID number and the code to determine machine.
The section ends with ENDA and 9999 punched on two cards.

	Card Number One							Card Number Two								
						Hours of Use				Repairs				Truck Inputs		
	I.D. Number	Code	Machine Description	Purchase Price	Age	Deprec. Rate	Annual	Crop	Obsolete	Present Value	Hourly	Yearly	TYPE	Fuel Cons.	Insur.	Licence	Storage
1-4	6-8	10	11-42	43-49	50-55	56-61	62-67	68-73	2	3-10	11-18	19-26	27	28-35	36-43	44-51	52-59
MACH																	
MACH																	

Card Number One									Card Number Two								
	I.D. Number	Code	Machine Description	Purchase Price	Age	Deprec. Rate	Hours of Use		Obso- lete	Present Value	Repairs		T Y P E	Fuel Cons.	Truck Inputs		
							Annual	Crop			Hourly	Yearly			Insur.	Licence	Storage
1-4	6-8	10	11-42	43-49	50-55	56-61	62-67	68-73	2	3-10	11-18	19-26	27	28-35	36-43	44-51	52-59
ENDA																	
9999																	

BUDGET SECTION

Price and yield input should be entered on a consistent and per acre basis as they are multiplied together to generate gross returns per acre.

Card Number One		Card Number Two					
	Title of Budget	Management Charge	Overhead Charge	Months Operating Capital	Expected Yield	Expected Price	Unit
1-4	6-77	1-7	8-14	15-21	22-28	29-35	36-43
BUDG							

LABOR

Specify up to 9 classes of labor with the rate expressed in dollars per hour, $/hr.

Card Number One

Labor Class 1	Name	Rate	Labor Class 2	Name	Rate	Labor Class 3	Name	Rate	Labor Class 4	Name	Rate	Labor Class 5	Name	Rate
1	2-9	10-16	17	18-25	26-32	33	34-41	42-48	49	50-57	58-64	65	66-73	74-80
1	Operator													

Card Number Two

Labor Class 6	Name	Rate	Labor Class 7	Name	Rate	Labor Class 8	Name	Rate	Labor Class 9	Name	Rate
1	2-9	10-16	17	18-25	26-32	33	34-41	42-48	49	50-57	58-64

OPERATIONS SECTION

Specify individual operations used to till, plant, cultivate, and harvest the crop. Implements pulled in tandem may be specified as one operation. Up to three machines and one tractor may be listed as one operation. Extra lines may be used to specify more complicated operations. For example, if two or more classes of labor are needed for one operation, specify the second and following classes on additional lines. Two cards, ENDA and 999 are required to end this section.

Card Number One		Card Number Two									
	Name of Operation	ID Tractor	ID 1st Machine	ID 2nd Machine	ID 3rd Machine	Times Over	Acres Covered	Machine Hours	Labor Hours	Labor Class	Other Costs
1-4	6-29	1-3	4-6	7-9	10-12	15-19	20-24	25-29	30-34	35	36-40
OPER											
OPER											

Card Number One		Card Number Two									
	Name of Operation	ID Tractor	ID 1st Machine	ID 2nd Machine	ID 3rd Machine	Times Over	Acres Covered	Machine Hours	Labor Hours	Labor Class	Other Costs
1-4	6-29	1-3	4-6	7-9	10-12	15-19	20-24	25-29	30-34	35	36-40
ENDA											
9999											

MATERIALS SECTION

The materials section allows the user to input and itemize all materials used in a typical budget. Up to five subtotals may be called for. A subtotal may be requested by including two cards, SUBT and 9999. The section ends with two cards ENDA and 9999.

	Card One		Card Two			
	Name of Material	Type or Description	Amount Applied	Number of Applications	Price/Unit	Unit
1-4	6-30	31-57	1-7	8-14	15-21	22-29
MATE						
MATE						

	Card One		Card Two			
	Name of Material	Type or Description	Amount Applied	Number of Applications	Price/Unit	Unit
1-4	6-30	31-57	1-7	8-14	15-21	22-29
ENDA						
9999						

REAL ESTATE SECTION

To end the program include an ENDJ card punched in columns 1-4. New budgets with the same machinery set, require a BUDG, OPER and REAL sections.

	Card Number One					Card Number Two			
	Land Values Without Bldg	Building Values Per Acre	Building Deprec. Rate	Interest Rate Real Estate	Net Taxes Per Acre	Acres Owned	Acres Rented	Land Rent Per Acre	Annual Bldg. Rent
1-4	6-13	14-21	22-29	30-37	38-45	1-8	9-16	17-24	25-32
REAL									

ENDJ	

RECENT PUBLICATIONS FROM THE ECONOMICS BRANCH OF THE ONTARIO MINISTRY OF AGRICULTURE AND FOOD

Agricultural Statistics for Ontario, 1983, by Statistics Section.

The Economics of Soybean Production in Ontario, 1980, by G.A. Fisher. Economics Information, Dec. 1981.

The Impact of Metric Conversion of Packaging on Fluid Milk Consumption: A Case Study of the Thunder Bay Market, by T. Crozier. Economic Research, Feb. 1982.

The Economics of Producing Flue-Cured Tobacco in Ontario, by G.A. Fisher. Economics Information, Jan. 1983.

Estimated Cost of Growing Potatoes, 1982; and Projections for 1983, by B. Campbell. Economics Information, Jan. 1983.

Potato Packing and Storage Costs 1981-82 Crop Year, by B. Campbell. Economics Information, Jan. 1983.

Estimated Cost of Growing White Beans, 1982, by B. Campbell. Economics Information, May 1983.

Apple Production Costs for Standard and Size-Controlling Trees, Ontario, 1982, by E.D. McKibbon. Economics Information, July 1983.

Beef Feedlot Cost Study, Southern and Western Ontario, 1982, by F.R. Abraham. Economics Information, July 1983.

Economics of Fresh-Market Tomato, Cabbage, and Cauliflower Production in Ontario, 1982, by G.A. Fisher. Economics Information, Aug. 1983.

Farm Rental Arrangements in Ontario, 1982, by G.A. Fisher. Economics Information, Sept. 1983.

A Survey of Custom Farmwork Rates Charged in Ontario, 1983, by G.A. Fisher. Economics Information, Jan. 1984.

Strawberry Production Costs in Ontario, by Dirk Buth and Errol McKibbon. Economics Information, Rept. No. 84-03, Mar. 1984.

Single copies of the above publications are available on request from the Economics Branch, Ontario Ministry of Agriculture and Food, Legislative Buildings, Queen's Park, Toronto, Ontario M7A 1B6.

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